Bibliographie

A. V. Balakrishnan, Stochastic Differential Systems. I. Filtering and Control. A Function Space Approach (Lecture Notes in Economics and Mathematical Systems, Vol. 84.), V+525 pages, Berlin—Heidelberg—New York, Springer-Verlag, 1973.

Systems theory is one of the youngest disciplines of applied mathematics. Its three main branches are 1) the filtering of the useful signal from its noisy observations, 2) the optimal control of systems on the basis of a noisy output signal and of known system parameters, and 3) the identification of structure and parameters of unknown systems on the basis of their response to known inputs. The study of stochastic systems was necessitated because random disturbances could not be investigated within the framework of the deterministic theory. In the last two decades sveral results of great practical importance were obtained by different, more or less heuristic methods.

The aim of the author of the present book is to develop a unified rigorous mathematical theory of stochastic systems governed by linear stochastic differential equations with the Wiener process as forcing term. The first five chapters (I. Preliminaries; stochastic processes, II. Linear stochastic equations, III. Conditional expectation and martingale theory, IV. Radon-Nikodym derivatives with respect to Wiener measure, V. The Ito integral) present the necessary theoretical background. In Chapter VI the filtering problem is studied, the Kalman—Bucy equations are derived in a rigorous way, and asymptotic problems are investigated. Chapter VII deals with the optimal control of linear systems. Some typical problems are explicitely solved. In Chapter VIII the problem of the identification of the parameters of a linear system on the basis of noisy observations is investigated. It is proved that asymptotically unbiassed consistent estimates of the system parameters exist and a convergent approximating sequence is constructed. Some facts from operator theory are added as appendices, and special problems of sampled data systems are considered as supplementary notes.

The presentation is concise, up to date, and apart form some misprints, accurate. The approach of the author via martingale theory and functional analysis allows an elegant, unified presentation of the whole material. The book is written for mathematicians. The reader is supposed to be familiar with functional analysis and the theory of stochastic processes. To understand the practical motivation of the results some knowledge in systems theory is also necessary.

Summing up, the author succeeded in giving a systematic, rigorous presentation of linear control theory. His book proves again that applications may need some deep mathematics. Having read the book one is looking forward with much interest to the second volume.

D. Vermes (Szeged)

W. Blaschke—K. Leichtweiss, Elementare Differentialgeometrie, 5. vollständig neubearbeitete Auflage von K. Leichtweiss (Die Grundlehren der mathematischen Wissenschaften in Einzeldarstellungen, Bd. 1), X+369 Seiten, Berlin—Heidelberg—New York, Springer-Verlag, 1973.

The three volumes of Blaschke's famous Lectures on Differential Geometry (*Vorlesungen über Differentialgeometrie und geometrische Grundlagen von Einsteins Relativitätstheorie.* I, II, III, Berlin, Springer, 1921—1923—1929) have been used as a standard textbook and a book of reference for generations of differential geometers. Volume I (*Elementare Differentialgeometrie*) of these lectures, wich deals with the theory of curves and surfaces in Euclidean 3-space, has the extra valuable feature that the author concentrates on the properties of the curves and surfaces "in the large". It is this why the book has remained up-to-date even after half a century. However, the varied terminology, the occasional incompleteness of proofs, the inadequate foundation of the invariant calculus used, and the absence of references to recent results caused some difficulties for the readers of our days.

The present 5. edition revised by K. Leichtweiss eliminates these insufficiences and the considerably increased treatment of the global theory of surfaces contains the significant results of the last years also. The reader studying the proofs of the various uniqueness theorems on the sphere, on convex and general surfaces, of existence and other theorems becomes acquainted whith the universal methods of the global theory of surfaces.

The last chapter of the previous editions on line geometry has been omitted. On the other hand, many new exercises are added.

The book in the present form is unique in its kind as a textbook of the global theory of surfaces.

P. T. Nagy (Szeged)

P. L. Butzer—R. J. Nessel, Fourier Analysis and Approximation. Vol. I. One-dimensional theory (Mathematische Reihe, Lehrbücher und Monographien aus dem Gebiete der exakten Wissenschaften, Band 40), XVI+553 pages, Birkhäuser Verlag, Basel und Stuttgart, 1971.

This two-volume work is intended to provide a systematic treatment of Fourier analysis. The first volume covers the classical theory of Fourier series and Fourier transforms in the one-dimensional case and those areas of approximation theory which are in some sense related hereto. No attempt is made to give a complete account of the present stage of Fourier series or integrals, or of classical approximation theory.

The book is written both for undergraduate students and for researchers in mathematics, applied mathematics, and related fields such as mathematical physics. The reader is merely assumed to be familiar with Lebesgue integration and with the elements of functional analysis.

The book consists of preliminaries and five parts, divided into thirteen chapters.

One of the fundamental problems of analysis is to approximate a given function f in some sense or other by functions which have "better" properties than f. The approximation of f by singular convolution integrals, which constitutes the material of Part I, is of special interest. The theory of singular integrals is closely connected with the theory of Fourier series since the nth partial sum of the Fourier series of a function f may be written as a singular integral with the Dirichlet kernel, while the arithmetic means of these partial sums form a singular integral with the Fejér kernel. The basic properties of singular integrals are studied in Chapter 1. The classical direct theorems of D. Jackson and the inverse theorems of S. N. Bernstein, which play a fundamental role in the approximation of periodic functions, form the material of Chapter 2. While Chapter 1 is exclusively concerned with singular integrals on the circle (the 2π-periodic case), Chapter 3 is devoted to a detailed study of singular integrals on the infinite line.

Part II is devoted to the method of Fourier transforms, which is a particular instance of the method of integral transforms, and is of central significance in many problems of mathematical analysis. The method is briefly as follows: To solve problems in the transformed state (which is generally simpler), and then apply a suitable inversion formula to obtain the solution of the original problem. Whereas Chapter 4 is concerned with the finite Fourier transform, Chapter 5 is reserved to the Fourier transform on the real line. Chapter 6 gives a detailed treatment of representation theorems. Necessary and sufficient conditions for representation are supplied as well as a short account of classical multiplier theory. Chapter 7 is devoted to the first and best-known application of Fourier transform methods, namely to the solution of partial differential equations.

Part III deals with Hilbert transforms and various applications. Chapter 8 is devoted to the study of Hilbert transforms on the line, Chapter 9 is concerned with the parallel theory of Hilbert transform on the circle, or of the conjugate function as it is called in the theory of Fourier series. It is useful not to regard the Hilbert transform as a transformation but as a function. Indeed, if it is not possible to characterize certain function classes in terms of f, it is often so in terms of the conjugate function $\tilde{f}$.

The problem of determining the optimal order of approximation of a function f by a sequence of polynomials allows two different interpretations: either one varies the sequence of polynomials that approximates an f satisfying given properties, or one keeps the approximation process fixed and varies the properties of the function f to obtain the optimal order. In the former case one obtains a result on the best order of approximation $E_n(f)$ for all f with the given properties, but in general no information is available concerning the sequence of polynomials for which this optimal approximation is attained. In the latter case the result is that the approximation by the given process will be optimal for all functions belonging to a certain class, the so-called saturation class.

The function classes that arise in connection with saturation theory are characterized in Part IV. These classes are connected with various generalizations of the calssical rth derivative. Chapter 10 is concerned with the case when r is integral, in particular, with Riemann and Taylor derivatives. Chapter 11 deals with the fractional r case, among other things, with Riemann—Liouville and Riesz fractional integrals, derivatives of fractional order, etc.

Part V is devoted to the study of saturation theory for convolution integrals. Chapter 12 deals with the more classical aspects of saturation theory, thus treating the saturation problems in C and L^p, $1 \leq p < 2$ both on the circle and on the line. Chapter 13 gives the extension to the case L^p, $2 < p < \infty$, by duality argument. Furthermore, a brief account of saturation theory on arbitrary Banach spaces is given.

Many of the results, especially of Chapters 10—13, are presented here for the first time in book form. The book has been carefully and accurately written. Even the student reader is able to follow all the steps of the proofs.

Each Chapter ends with "Notes and Remarks". These contain historical comments and detailed references to about 650 papers or books treating or supplementing specific results of the chapter in question. There are approximately 550 exercises (Problems), many consisting of several parts, ranging from fairly routine applications of the text material to those that extend the coverage of the book.

Thus the present volume contains a great wealth of information, in a concise and polished form. As the authors promise in the Preface, the second volume, in preparation, will deal with the more abstract parts of the material. Special emphasis will be placed upon the n-dimensional theory. Fourier transforms will be discussed in the setting of distribution theory, and a systematic account of those parts of approximation theory will be given which are concerned with functions of several variables.

Ferenc Móricz (Szeged)

Max Deuring, Algebren (Ergebnisse der Mathematik und ihrer Grenzgebiete, Bd. 41), 2., korrigierte Auflage, VIII+143 Seiten, Springer-Verlag, Berlin—Heidelberg—New York, 1968.

The original edition of this work came out a third of a century ago. In spite of this fact, the book is still useful for the students of today, as an introduction to its subject-matter and as a manual for those early parts of the theory which remained interesting and relevant. To justify this, we list the titles of the chapters:

I. Grundlagen. II. Die Struktursätze. III. Darstellungen der Algebren durch Matrizes. IV. Einfache Algebren. V. Faktorensysteme. VI. Theorie der ganzen Grössen. VII. Algebren über Zahlkörpern. Zusammenhang mit der Arithmetik der Körper.

B. Csákány (Szeged)

W. F. Donoghue, Jr., Monotone matrix functions and analytic continuation (Die Grundlehren der mathematischen Wissenschaften in Einzeldarstellungen, Bd. 207), 182 pages, Springer-Verlag, Berlin—Heidelberg—New York, 1974.

A real valued function $f(x)$ on the interval (a, b) is said to belong to the class $P_n(a, b)$ if for any two symmetric matrices of order n with spectra in (a, b), say A and B, $A \geqq B$ implies $f(A) \geqq f(B)$, inequalities between symmetric matrices meaning the corresponding inequalities for the quadratic forms. This class of functions (also called monotone matrix functions of order n) was first studied by KARL LÖWNER in his fundamental paper: Über monotone Matrixfunktionen, *Math. Zeitschrift*, **38** (1934), 177—216. He obtained conditions for a function to belong to one of the classes $P_n(a, b)$. His deepest result is that if $f(x)$ belongs to $P_n(a, b)$ for given (a, b) and *all* $n(=1,2,\ldots)$ then $f(x)$ can be continued analytically to the complex upper (open) half-plane so that $\mathrm{Im}\, f(z) \geqq 0$ if $\mathrm{Im}\, z > 0$.

Löwner's theory is in close relation with several other important problems for matrices, analytic functions, reproducing kernels, positive definite functions, integral representations, etc. The book of Prof. DONOGHUE gives a detailed and readable survey of the pertaining, intriguing part of mathematical literature.

Béla Sz.-Nagy (Szeged)

Stefan Fenyő, Moderne mathematische Methoden in der Technik, Bd. 2 (International Series on Numerical Mathematics, 11), 336 Seiten, Basel—Stuttgart, Birkhäuser Verlag, 1971.

Dieser Band behandelt „finite" Methoden und gliedert sich in drei Abschnitte. Der erste ist der linearen Algebra gewidmet (Matrizen und deren Anwendungen auf lineare algebraische und Differential-gleichungssysteme, Stabilitätsfragen und andere Aufgaben aus der Mechanik und der Theorie der elektrischen Netzwerke; Elementarteilertheorie und Jordansche Normalform werden aber nicht einbegriffen). Der zweite Abschnitt gibt einen Einblick in die Theorie der linearen und konvexen Optimierung. Der dritte betrachtet die Elemente der Graphentheorie (mit Anwendung etwa auf die elektrischen Kreisnetze).

Das Buch wird vom Nutzen für studierende der Mathematik und Technik. Die Ausstattung ist schön; leider sind aber manche Druckfehler im Text geblieben (Interpunktuation, „immaginär" statt „imaginär", „Boolsch" statt „Boolesch", usw.).

B. Sz.-Nagy (Szeged)

K. O. Friedrichs, Spectral theory of operators in Hilbert space (Applied Mathematical Sciences, Vol. 9), VIII+244 pages, Springer-Verlag, New York—Heidelberg—Berlin, 1973.

The book intends "to provide an introduction to the spectral analysis of self-adjoint operators within the framework of Hilbert space theory. The guiding notion of this approach is that of spectral representation."

In today's abundance in introductory texts in operator theory it is a particular experience to the reader to learn what — and how — the distinguished author, whose name is closely related to the development of both theory and applications in this field, has to teach him. Here are some of the characteristic features.

Almost nothing of "modern" real function theory is used: Lebesgue square integrable functions — or rather their equivalence classes — only appear as "ideal" elements of the metric completion of the space of piecewise continuous functions. (This voluntary self-constraint is, however, not observed in Sec. 38 with Lebesgue (L_1) integrable functions.) Stieltjes integral representation of self--adjoint operators, i.e. the familiar formula

$$A = \int \lambda \cdot dE_\lambda$$

never appears, instead the "spectral representation"

$$A\varphi \sim \alpha \cdot \varphi(\alpha) \quad \text{for} \quad \varphi \sim \varphi(\alpha)$$

is derived in a direct way. Continuous attention is being paid, all over the book, to ordinary and partial differential operators and integral operators. Perhaps the most instructive are the last two chapters (VII. Differential operators, VIII. Perturbation of spectra), fields on which we owe particularly much to personal work of the author. A clear indication of the basic ideas of his pioneering contribution to the study of perturbation of continuous spectra is particularly welcome.

Béla Sz.-Nagy (Szeged)

J. Hale, Functional differential equations (Applied Mathematical Sciences, Volume 3), IX+238 pages, New York—Heidelberg—Berlin, Spinger-Verlag, 1971.

In the case of ordinary differential equations it is assumed that the future behaviour of the phenomenon described by the equation is uniquely determined by the present and is independent of the past. Naturally many models are better represented by differential-difference or more generally by functional differential equations where the past influences the future in a significant manner. Although the first differential-difference equations were studied by the Bernoullis very little was done until 1950. In the last two decades the subject has grown tremendously. There were made only a few attempts to systematize the subject-matter (e.g. the works of Mishkis, Norkin and Bellman—Cooke).

This book contains the lectures on functional differential equations held by the author — who reached several important results in this branch of mathematics, too — at UCLA in 1968—1969.

The purpose of the book is manifold. It is intended to familiarize the reader with some of the problems and techniques in functional differential equations with emphasis on the special types of the equations and on the differences with the ordinary differential equations. The material is presented in a way that will prepare the reader for intelligent study of the current literature and for research in functional differential equations. The treatment is not too abstract — so as to reach a wide class of readers — but where it is needed the theorems are very general (e.g. the existence theorems) using some special tools of functional analysis too. In order not to lose sight of the applied side of the subject, considerable space has been devoted to stability problems, to specific methods which are widely used in applications.

Summarizing the book is a great help to anyone wanting to get acquainted with functional differential eqations including the up-to-date problems of the subject, too.

L. Hatvani—L. Pintér (Szeged)

Einar Hille, Methods in classical and functional analysis, IX+486 pages, Addison—Wesley Publ. Co., Reading, Mass., 1972.

From the Preface: "Modes come and go in mathematics as in most fields. During the half-century and more that I have worked in the vineyard I have heard many dire predictions for the fate of my ideas and interests. Abstraction has been in the saddle during most of the time and has ridden us mercilessly. In a modest way I have taken part in this development. I did not believe in abstraction *per se;* one should know what one is trying to generalize and one should show that the generalization is significant. I have tried to keep at least one foot on the ground while craning my neck to look into Heaven."

This attitude of the author is truly reflected in the present book also. It ranges over various domains of problems — from matrix analysis to Lebesgue integral (including the integral of vector-valued and operator-valued functions), from complex analysis in linear spaces to Banach algebras and spectral theory, from fixed point theorems to functional equations and mean values: with many instructive details and hints, and with a large amount (850!) of exercises scattered throughout the book, "a fair part of which are byproducts of the author's own research".

The book is another useful gift of the distinguished analyst to the mathematical community.

Béla Sz.-Nagy (Szeged)

Klambauer, Real Analysis, American Elsevier Publ. Co., New York—London—Amsterdam, XI+436 pages, 1973.

"This book treats basic matters in contemporary real analysis and quite properly focuses on integration theory."

Lebesgue measure and integral on R^1 are introduced in the classical way of Carathéodory. This and the elements of the theory of Lebesgue spaces L^p are done on the first 100 pages. The next 40 pages deal with differentiation and absolute continuity, and another 40 pages with measure and integration on abstract spaces and with product measure (Fubini's theorem). After a 40 page introduction to topological and metric spaces, there follows, on more than 100 pages, a detailed exposition of the Daniell and Stone—Daniell integral. The book ends with a chapter, on 50 pages, on normed linear spaces.

There are many interesting and instructive applications, built into the main text, and also a great number of exercises at the end of each chapter, which enhance the value of the book as a textbook for graduate students. Some parts, however, as the chapter on Stone—Daniell integration, can serve as bases of seminars for more advanced students.

Béla Sz.-Nagy (Szeged)

W. Klingenberg, Eine Vorlesung über Differentialgeometrie (Heidelberger Taschenbücher, 107), X+135 pages, Springer, Berlin—Heidelberg—New York, 1973.

The book contains the standard matter of introductory lectures, especially the global properties of curves and surfaces, however the treatment is of a new type and very didactic. The classical vector method, tensor calculus, and the modern formalism are combined very advantegeously. The theory of curves, the local theory of surfaces and the theory of geodesics in Riemannian geometry of dimension 2 are treated without using the notion of differentiable manifolds. This abstract notion is defined only afterwards, as the reader has already become acquainted with a lot of examples and with geometric properties of surfaces. Then the author deals with the global theroy of surfaces.

As the author remarks in the preface, Blaschke's and Chern's lectures on differential geometry made an influence on his treatment.

The book gives a good instance of the modern teaching of differential geometry.

P. T. Nagy (Szeged)

A. G. Kurosch, Gruppentheorie I—II (Mathematische Lehrbücher und Monographien; I. Abteilung, Mathematische Lehrbücher, Bd. III/I—II), Bd. I: XXII+360, Bd. II: XIV+358 Seiten, Akademie-Verlag, Berlin, 1970—1972.

This book is the German translation of the third, enlarged (Russian) edition of this, already classicial group-theoretic text-book. It contains the whole material of the second edition and ten further paragraphs borrowed from the first one (e.g., Permutation groups, The field of p-adic numbers, Locally free groups, etc.); finally, it includes a detailed and complete account of the progress in the theory of infinite groups from 1952 to 1965, written with masterly didactics, a peculiar characteristic of the author. A full bibliography on infinite groups, effective up to 1968, is also presented, consisting of more than 2100 items.

The translation is conscientious and the get-up of the book is worthy of its contents.

B. Csákány (Szeged)

Studies in Numerical Analysis. Papers in honour of Cornelius Lánczos. Edited by B. K. P. Scaife, XXII+333 pages, Royal Irish Academy, Academic Press, London—New York, 1974.

These studies were published in honour of the 80th birthday of the noted scholar. He was born on February 2nd, 1893, in Székesfehérvár, Hungary, studied in Budapest and Szeged, with Fejér, Eötvös and Ortvay, became assistant to Madelung in Frankfurt, then went to Berlin at a personal invitation of Einstein. In 1931 he was appointed to the Chair of Mathematical Physics at Purdue University in the USA, a post which he held until 1946. Up to this time his work was concerned mainly with relativity theory and quantum theory. However, he also took an ever-increasing interest in areas of mathematics which would now come under the heading of numerical analysis. This interest lead him, after 1946, to important appointments with the industry and aviation, and to the Institute of Numerical Analysis at UCLA. His contributions to numerical and applied mathematics are manifold (approximations, Fourier series, variation principles, etc.) and won him a high international reputation in mathematics equal to his already well established reputation in physics. In 1954 he followed an invitation to a Senior Professorship at the School of Theoretical Physics of the Dublin

Institute for Advanced Studies, where he pursued his research activity in full vigor until the very end of his life. He died unexpectedly on June 26, 1974, while on a visit with his colleagues and relatives in Budapest. He is buried in his native country.

In his life Lánczos has received many honours, among them a Membership of the Royal Irish Academy. This Academy honoured him also by the present valuable and beautiful volume, dedicated to his 80th birthday.

The volume brings a series of studies most of which are illuminating — or closely related to — the personal activity of Lánczos. It will appeal to all matematicians and physicists concerned with numerical analysis, and also to those interested in the life and achievements of Cornelius Lánczos. It is a highly attractive reading and a tribute worthy of the personality of the distinguished scholar.

Béla Sz.-Nagy (Szeged)

W. Ledermann, Introduction to Group Theory, VII+176 pages, Oliver and Boyd, Edinburgh, 1973.

This is a very good introduction to group theory. As it is written in the author's introduction "the book is intended to cover the bulk of the work on group theory in an Honours Course".

Chapters: The group concepts. — Subgroups. — Normal subgroups. — Finitely generated abelian groups. — Generators and relations. — Series of subgroups. — Permutation groups. — Sylow's theorems.

The style of the book is clear. Proofs are carefully arranged and presented in detail. In order to make the concepts and proofs clear they are mostly illustrated by examples. Each chapter is followed by many exercises.

J. Gécseg (Szeged)

E. B. McBride, Obtaining Generating Functions (Springer Tracts in Natural Philosophy, Volume 21), VIII+100 pages, Springer-Verlag, Berlin—Heidelberg—New York, 1971.

This is an expository work at the level of the beginning graduate student. It contains five chapters, a bibliography and an index.

Chapter I gives the reader the necessary definitions and basic concepts, and explains and illustrates the direct summation techniques developed by E. D. Rainville. These methods are principally based on inventive manipulation with power series.

L. Weisner devised a method for obtaining generating functions for sets of functions which satisfy certain conditions. Among these functions are the Hermite, Bessel, generalized Laguerre, and Gegenbauer polynomials, etc. From the ordinary differential equation which is satisfied by the set of these functions a partial differential equation is constructed. The method is based on finding a nontrivial continuous group of transformations under which the partial differential equation is invariant.

Weisner's group-theoretic method is explained in Chapter II and is further illustrated in Chapter III. This method provides in particular a unified treatment of the six well-known generating functions for the Laguerre polynomials, originally found by various other methods.

Truesdell's method is studied in Chapter IV. For a given set of functions $\{f(z, \alpha)\}$ the success of this method depends on the existence of certain transformations. If $\{f(z, \alpha)\}$ can be transformed into

$F(z, \alpha)$ or $G(z, \alpha)$ such that $\frac{\partial}{\partial z} F(z, \alpha) = F(z, \alpha+1)$ or $\frac{\partial}{\partial z} G(z, \alpha) = G(z, \alpha-1)$ (ascending equation or descending equation, respectively) then from each transformed function a generating function can be obtained.

The methods of RAINVILLE, TRUESDELL and WEISNER were developed in the last twenty years. Although it is the primary purpose of the book to bring to the reader's attention these three widely applicable methods, there are other useful methods in the literature which also deserve consideration. Some of these, e.g. generating functions in differentiated form or in integrated form, the contour integral method, etc. are presented in Chapter V.

The book is written in a concise but always clear and well-readable way. It will be useful for everyone interested in the field of Special Functions.

Ferenc Móricz (Szeged)

Karl Schröter, Mathematik im System der Wissenschaften (Sitzungsberichte des Plenums und der Klassen der Akademie der Wissenschaften der DDR, Jahrgang 1972. Nr. 11), 76 Seiten, Berlin, Akademie-Verlag, 1973.

Das Heft berichtet über die Tätigkeit 1969—1972 einer "problemgebundenen" Klasse der Akademie der Wissenschaften der DDR, und betrachtet insbesondere "Entwicklungstendenzen der Analysis und Auswirkungen auf Nachbargebiete" und „Die Algebraisierung der modernen Mathematik auf der Grundlage der Theorie der mathematischen Strukturen."

Béla Sz.-Nagy (Szeged)

A. Spătaru, Theorie der Informationsübertragung. Signale und Störungen (Elektronisches Rechnen und Regeln, Sonderbd. 18), XXII+692 Seiten, Berlin, Akademie-Verlag, 1973.

Die wichtigsten Hilfsmittel der klassichen Nachrichtentechnik, die sich mit Übertragung von analogen, deterministischen Signalen bechäftigt, waren trigonometrische Funktionen und die Laplace—bzw. Fourier—Transformation. Da während der Übertragung von Information auch zufällige Störungen auftreten, wurde die Wahrscheinlichkeitstheorie in das mathematische Arsenal der Nachrichtentechniker aufgenommen. Zufällige Signale werden i. A. durch ihre Korrelationsfunktionen und Leistungsspektren (die Fourier-Transformierte der Korrelationsfunktion) beschrieben. In den letzten 30 Jahren hat man die Vorteile der diskreten Signale erkannt. Die mathematischen Probleme dieser Übertragungsweise, die in erster Linie mit der geeigneten Kodierung der Information zusammenhängen, sind in der von C. Shannon begründeten Informationstheorie behandelt.

Das vorliegende Buch behandelt systematisch und sehr ausführlich alle die oben erwähnten mathematischen Methoden der Nachrichtentechnik. Es wurde für Ingenieure geschrieben, zur Verifikation der Ergebnisse werden mathematische und anschauliche Argumente verwendet. Jedoch werden solche Probleme, wie optimale Filtration, Vorhersage, Steuerung, die tieferen mathematischen Apparat benötigen, nicht betrachtet.

D. Vermes (Szeged)

S. J. Taylor, Introduction to measure and integration, VI+266 pages, Cambridge University Press, Cambridge, 1973.

First published as Chapters 1—9 of J. F. C. KINGMAN and C. J. TAYLOR, *Introduction to measure and probability* (Cambridge University Press, 1966). — Measure is studied first as a primary concept and the integral is obtained later by extending its definition from 'simple functions' using monotonic sequences. Beyond the standard elements of the Lebesgue theory of measure and integral (including the Radon—Nikodym theorem, L_p spaces, and the theory of the Daniell integral and Haar measure, etc.) one also finds in the book some elements of Functional Analysis (Riesz—Fischer, Hahn—Banach, maximal ergodic theorem, etc.).

Béla Sz.-Nagy (Szeged)

W. Walter, Gewöhnliche Differentialgleichungen. Eine Einführung (Heidelberger Taschenbücher, Bd 110), X+229 pages, Berlin—Heidelberg—New York, Springer Verlag, 1972.

This book grew out of the subject-matter of courses held by the author at the University of Karlsruhe for many years. The first three chapters (I. Ordinary Differential Equations of the First Order, II. Systems of Differential Equations of the First Order and Differential Equations of Higher Order, III. Linear Differential Equations) contain the indispensable fundamentals of the theory. The major part of the material of the fourth and fifth chapters (IV. Linear Systems on the Complex Plane, V. Boundary- and Initial-value Problems. Stability) including, for example, the expansion theorem for the Sturm—Liouville case, usually is omitted from introductory text-books. The addenda and problems draw a picture of some current questions of the modern theory of differential equations. The precise notation system and treatment of the book follow the up-to-date results of the theory; in some parts this can make difficulties for beginners. The great advantage of the treatment is that many proofs are based on a common method, namely on the fixed point theorem relating to the strict contractions in a Banach space. Such method should be considered as a tool which avoids the repetition of standard arguments and permits one to concentrate on the essential elements of the problem.

To sum up, we recommend this excellent book to the attention of students and lecturers interested in the theory of differential equations including its methodical problems, too.

L. Hatvani (Szeged)